CURRENT SITUATION AND PERSPECTIVES OF THE CLEAN CITIES PROGRAM IN SANTIAGO, CHILE

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1. INTRODUCTION

The Clean Cities Program, established by the U.S. Department of Energy in Santiago, Chile in 1996, was implemented in a series of phases that are described as follows:

FIRST PHASE

Arrival of natural gas in Santiago, Chile: The primary objective of the Clean Cities Program is the implementation of alternative fuels in the transportation sector. The Program was initiated in June 1996 with the visit of a DOE scoping mission to Chile. This group made initial contact with members of the public and private sectors in Chile, describing the high quality results the Program had in numerous States in the U.S., and expressing the importance of starting an international branch of the Program. The scoping mission determined that Santiago, Chile would be the appropriate place to begin and develop this effort. To launch the Program, a local Program Coordinator was hired, who in turn identified an American international consultant, in order to coordinate the launch. So it was that the Program officially began in September 1996, with its first activity being the organization of a seminar to introduce the Clean Cities Program in Santiago, Chile that October.

The results of the seminar indicated that, given the high levels of atmospheric pollution in Santiago, it would be relevant to support implementation of compressed natural gas (CNG) in the city's public transportation sector. The interest demonstrated by the stakeholders was confronted by the following obstacles:

- The arrival of natural gas from Argentina would occur in 1997;
- The market penetration priorities of the natural gas distribution company started with the industrial, commercial, then public and residential sectors, leaving the transportation sector as the last priority;
- There was strong opposition from the Santiago Public Transportation private operators, due to the great difference in investment in diesel and CNG buses, which was approximately US$100,000 in 1997;
- Opposition by METALPAR, the distributor of the city buses, which controls more than 80% of the Chilean market with Mercedes Benz diesel motors;
- The difficulties in installing service stations that could provide CNG with the same facility as other, more traditional, fuels.

In spite of these barriers, the decision was made in 1997 to continue the Program, which leads to the second phase.

SECOND PHASE

Diffusion and Consolidation of the Program: In this second phase, and particularly in 1997, the Chilean president, Eduardo Frei, and the Mayor of Chicago, Richard Daley signed a Memorandum of Understanding (MOU), agreeing to proactively share information regarding the progress of each city concerning transportation and clean fuels.

In 1998, the Metropolitan Regional Government signed an agreement of cooperation with the U.S. Department of Energy (DOE). Then Secretary of Energy, Federico Peña, and Metropolitan Supervisor, Germán Quintana, signed this agreement under the framework of the Clean Cities Program. At the same time, a demonstration of new transportation technologies was organized, including the presentation of a Thomas Built compressed natural gas (CNG) bus.

In the same year, and under the framework signed by the National Environmental Commission of the Metropolitan Region of Santiago (CONAMA RM), a study was contracted: *Follow-up of the Pilot Phase on Using Gaseous Fuels for Buses in the Metropolitan Region.* The purpose of this study was to demonstrate the environmental and social benefits of utilizing CNG technology in public transportation versus the continuous use of diesel technology.

The results of the study indicate an important social benefit associated with the implementation of CNG buses. This social benefit arises primarily from decreases in air and noise pollution, which in turn decrease the negative impact on the health of the local population. The decrease in primary pollutants produces a decrease in the environmental concentrations of various pollutants (specifically, particulate matter), when compared to diesel. The value of these social benefits is calculated at an average of US$26,238 per CNG bus introduced.

These conclusions were very important since they supported the option of initiating a process of mass incorporation of new (dedicated) CNG buses. This objective, initially shared by CONAMA RM and the Regional Metropolitan Government (Gobierno Regional, or GORE), was formulated into a pilot phase project to finance 50 CNG buses. And so, in 1998, a subsidy was implemented to finance the difference in investment costs between CNG and diesel buses. Additionally, the Corporation for the Development of Production (CORFO) was established, and acted as an intermediary in the financing operations of the subsidy.

Additionally, important advances were achieved in 1998 through the development of the regulatory framework for the incorporation of CNG in light duty vehicles, in the form of Supreme Decrees 55 and 196, which were enacted that year. Supreme Decree 55 (DS 55) established the guidelines for using CNG in lightweight vehicles, which are the same local pollutant emission regulations with

which lightweight vehicles with catalytic converters must comply. Supreme Decree 196 (DS 196) makes the use of CNG and LPG extensive[1].

In 1999, the discussion was centered on such issues as financing, CNG supply stations, and emissions regulations. The relevant government actors were CORFO, CONAMA RM y GORE, while those showing the most interest from the private sector were Metrogas, GasValpo, Energas, Gas Atacama y Tecnogas. Additionally, there was special interest on the part of then US Ambassador John O´Leary, and the USDOE.

In that same year, the USDOE financed a trip to various U.S. States. The delegation chosen for this trip was composed of: Gonzálo Rivas, Executive Vice-president de CORFO; Guido Girardi, Deputy of the Republic; Marcelo Belmar, Advisor to the Metropolitan Service Corp; Gianni López, Technical Secretary of CONAMA RM (currently National Director); and Jaime Parada, Coordinator for Clean Cities Santiago, Chile. Among the objectives of the visit were the definition of financial mechanisms for the mass incorporation of natural gas buses, and site visits to CNG bus plants and CNG supply service station plants. This mission made an important contribution to the consolidation of a critical mass of parties, in both the public and the private sectors, interested in incorporating CNG.

THIRD PHASE

Concrete Actions: The third phase began in 2000 with the coming together of different initiatives related to the incorporation of alternative fuels in the public transportation sector of the metropolitan area.

One of the first activities undertaken was a great driving push for the implementation of CNG in lightweight vehicles, with the ultimate goal of generating a critical mass of vehicles that would allow for the installation of CNG service stations.

In 2000, the international seminar *Public transportation, Natural Gas and the Environment: The Challenges of 2000* was held. This seminar was organized by SAIC, on contract to the USDOE, and proved to be very successful. The main conclusions of the international seminar are presented in Appendix 2.

A project sponsored by the American electric company PP&L was launched in this same year. The purpose of the project was to develop a prototype hybrid bus (diesel-electric) to provide a test of the technology and further develop it in Chile. In May of 2001 the prototype bus was launched and is currently operating in the streets of Santiago.

[1] These Decrees are presented in Appendix 1, in the original Spanish.

The bid for CNG bus subsidies was implemented in the year 2000 and eight were awarded to finance the investment differential between a CNG bus and a diesel bus. Only eight were awarded because the Metropolitan Association of Public Passenger Transportation of Passengers was uninterested, and other businesses that applied did not follow the guidelines. Currently, there are nine dedicated CNG buses circulating on the streets of Santiago and three CNG converted buses (mixed diesel-CNG).

There are currently 500 lightweight converted CNG vehicles, more than 100 of which are taxis, with the remaining belonging to private fleets. It warrants mention that the resulting demand for CNG has permitted the installation of six CNG refueling stations in the Metropolitan Region. Furthermore, lightweight vehicles are being converted in other cities in Chile, such as Valparaíso, Calama and Antofagasta.

It is worth mentioning that Metrogas (a Chilean natural gas distributor) has implemented a subsidy of US$700 as an incentive to convert 300 taxis to CNG. The total cost of such a conversion is US$1,700. This high cost is due to the environmental regulations that require the same emission levels as lightweight gasoline vehicles that use a catalytic converter, which requires the use of a third generation conversion kit.

The sales price of diesel fuel includes lower taxes than does that of gasoline, which is leading to growth in the use of this fuel by lightweight vehicles. This fact is provoking an extensive discussion in Santiago's Metropolitan Region, due to the fact that the contaminant emissions of lightweight diesel vehicles, particularly of nitrogen oxides (NOx) and particulate matter (PM 2.5), are higher than those from vehicles that use a catalytic converter. This implies a clear discrimination against CNG vehicles, considering that the same emissions levels are required of these as are required of lightweight gasoline vehicles using the catalytic converter.

In consideration of the preceding, and the possible effect that diesel combustion (in light- or heavy-weight vehicles) has on human health, in August 2001 an International Seminar was organized: "Clean Cities and the Utilization of Fuels in Public Transportation in the Metropolitan Region." This seminar was organized by the District of the Metropolitan Region and had the participation of international expert Dr. Jean Ospital, of the South Coast Air Quality Management District and other renowned Chilean experts. The International Seminar was sponsored by the US Embassy, the United Nations Development Program (UNDP) and CONAMA of the Metropolitan Region. The seminar was amply covered by the media, and some of the articles published in the press are presented in Appendix 3.

Another of the concrete actions carried out in 2001 relates to the "Chile Airport Reverse Trade Mission," that took place from February 12 to 15 of this year. A summary of the results, as well as the itinerary of the mission, is presented in Appendix 4. The concrete actions derived from this Mission have been the signing of a Cooperation Agreement among different Chilean institutions, and an inventory

of emissions of atmospheric contaminants from the International Airport, Arturo Merino Benitez (AMB). In November of this year, another International Seminar was held with the participation of American and Chilean experts to help further the Program.

2. CURRENT SITUATION

By virtue of the preceding, it can be seen that important efforts are being made to incorporate CNG into the public transportation system of Santiago and the rest of the nation, as a first step toward the incorporation of other alternative fuels or technologies in the transportation sector. For various reasons, including political-administrative, normative, legal, commercial and technical, the use of CNG in transportation hasn't been successfully extended to the public, although at this time the beginnings of this development can be observed.

The effort to incorporate CNG has received the decided support of union organizations that represent taxi drivers and the collective taxi businesses. Additionally, a renewed interest has been observed on the part of some collective transportation businesses in incorporating CNG buses in the 2003 bid for routes.

In spite of the difficulties confronted, some of the actors, both private (conversion firms and natural gas distributors) and public (CONAMA RM), are continuing to offer sustained support to the development of the distribution infrastructure, as well as the mass utilization of CNG in public transport. At the same time, the promulgation of the Urban Transportation Plan of Santiago (PTUS) has been a catalyst for increased effort towards the incorporation of CNG. For this reason, the CNG market today faces a special opportunity where it is possible to clearly identify both the course to follow in order to take advantage of the opportunities that present themselves, and also the public and private organizations that are opposed to said initiative.

The following section will analyze distinct aspects of the situation that is today facing the incorporation of alternative fuels in the Metropolitan Region's public transportation, in light of various relevant government initiatives such as the identified barriers and the activities that should be begun, under the framework of the Clean Cities Program, to bring about certain concrete actions related to the incorporation of American technology into the public transportation sector of the Metropolitan Region of Santiago, Chile.

2.1 URBAN TRANSPORTATION PLAN FOR THE CITY OF SANTIAGO (PTUS)

The Chilean government has recently set as a measure the implementation of the Urban Transportation Plan for the City of Santiago (PTUS), as the principal objective for providing an efficient and modern transportation system in Santiago, via be means of efficient and viable solutions in the medium term. Regarding transportation, PTUS aims to: i) Maintain the current public transportation routes; ii)

Reduce the average length of the routes; iii) Promote the use of non-motorized transport (pedestrian, cyclists); and iv) raise awareness among the users of private transportation of the cost of that choice of mobilization. Such measures should be attainable, considering the simultaneous objectives of reducing emissions of contaminants from transportation and incentivizing an organic urban development in the city.

Within this framework, it is recognized that the public transportation system is the only rational alternative for solving the environmental and movement problems of the city. In this sense, PTUS hopes to take maximum advantage of Santiago's installed capacity, especially that of METRO, which will be converted into the hub of the city's transportation, based on its related characteristics, with respect to the environment, security and principally its potential to undertake organic plans for urban development.

According to the preceding, certain policies and important lines of action have already been defined, principally as they refer to coherent infrastructure development. The Chilean government had already announced the extension of the Santiago Metro; the construction of various lines of the Light Metro, in part taking advantage of currently underutilized railway infrastructure; and the implementation of three large roadway projects under the rules of concession.

A date has also been announced for the launch of great initiatives designed to restructure public surface transportation: 2003, on the occasion of the next competitive bid for the urban streets of Santiago.

Such is the shape of the framework in which the State will be making important direct investments, as much in Metro as in the specialized infrastructure required to support a new system of public transportation. At the same time, private investors will contribute to the roadway infrastructure and the transportation companies should renew their fleets. The total amount of investments is in the range of $2 to $3 billion per decade.

To be successful, these incentives should include an explicit treatment of the major obstacles that are impeding efficient development of public surface transportation; the lack of physical and tariff integration within the metro, as much at the level of individual routes as between routes; the deficiency of maintenance systems; the structural insufficiencies in the organization of the companies; the inability of the regulatory and fiscal apparatus; the uncertainty associated with new technology; and the guiding light of the sectoral deficiencies mentioned above.

The obstacles to efficient administration in public transportation are so important that they promise threaten to compromise the success of the expected investments that in themselves are enormous considering the economy of the nation and the historic levels of sectoral spending. On the other hand, the possible solutions offer similarly enormous room for improvement, as much in terms of the cost of transportation as in environmental impacts and contribution to global problems.

Among the principal objectives of PTUS are the following:

- Offer incentives for more efficient and less polluting modes of transportation through measures such as the planning of transport systems, the administration of transit, an increase in the use of clean fuels and clean vehicles, etc. Some of the measures planned for Chile will include: Use of clean fuels; institutional capacity for the operation of routes bid for public transportation in Santiago and other cities in the nation; arrangement y rationalization of cargo transport in the city, including better utilization of the railways; and others to be defined later;

- Encourage the use of electric transportation vehicles. For example, one could provide incentives for the use of mini, battery-operated taxis that would operate at new Metro stations;

- Encourage the use of hybrid vehicles (internal combustion-electric motors). Distinct versions of these vehicles could be applied to mail routes that are complementary to the metro and its feeder routes.

2.2 BID FOR THE ROUTES IN THE CITY OF SANTIAGO FOR PUBLIC TRANSPORTATION IN COMBINATION WITH THE METRO

In 2001 or 2002 a Public Bid for Routes in the City of Santiago for the Contribution of Urban Public Transportation Services Remunerated by Passengers, in Combination with Metro, will be carried out. One of the central aspects of said bid is the incorporation of the Non-Polluting Technology Vehicles 2002 (VTNC2), Clean Technology Vehicles (VTL) and Zero-Emission Vehicles (V0E). According to what is expressly indicated in the basis for bid, the vehicles mentioned above will be awarded additional points when the bid is awarded. For further background information on this bid, contact: jparada@deuman.com.

2.3. BID FOR ROADS IN THE CITY OF SANTIAGO IN THE YEAR 2003

A new bid for public transportation routes is expected in 2003. Although the basis and fabric of the routes are still in the study phase, the future scenario of this bid already anticipates signals of change. For the first time, international companies are showing a firm interest in obtaining seven- to ten-year contracts. This international interest is based on the fact that the business of public transportation in Santiago generates some US$3 million per day, as it moves some 4.5 million passengers around this great city. The use of clean technology buses will be a reality under this bid.

There are at least four foreign consortia that are interested in the bid. The first of these is the Spanish Land Consortium ALSA, which already has bus connections in Chile. The other foreign consortia prefer to remain unknown at present.

This bid for routes offers a great opportunity for US businesses that have already made important efforts through the Clean Cities Program. Additional background on this legislation, presented in a communication from the American Embassy, is attached as Appendix 5.

2.4 THE USE OF TIER 1 REQUIREMENTS FOR LIGHT-DUTY DIESEL VEHICLES

In order to avoid the label of "dieselization" for its light-duty vehicle fleet, the Metropolitan Region's CONAMA has required that all light-duty diesel vehicles comply with the TIER 1 emission requirements as of 2002. Considering that said rules are only applied in the State of California, the National Automotive Association (ANAC) has publicly questioned this measure. Vehicle importers, organized through ANAC, which in part represent European and Asian manufacturers, are totally opposed to the implementation of this rule. Thus they have initiated a public campaign defending the current emissions guidance for light-duty diesel vehicles from Europe and Asia.

Although the rules have not yet been defined, it is expected that in 2002 the technical discussion about such emissions rules will continue.

3. RECOMMENDATIONS

The prospects described for the introduction of alternative transportation fuels, as much for light-duty as heavy-duty vehicles, are promising. Beyond the actions initiated by the State to encourage a technological change in transportation, and the incorporation of CNG in both light- and heavy-duty vehicles, the Clean Cities Program has played the role of catalyst for said initiatives.

Even though the support of the US Department of Energy hasn't always been permanent, it has always been available to the Metropolitan Region's environmental authority for support of information exchange and the diffusion, through International Seminars and Technological Missions, of the prospects presented by clean technologies and the introduction of alternative transportation fuels.

The US public sector, which has been collaborating with the Government of Chile via the Clean Cities Program since 1996, hasn't had similar support from private US companies in this sector.

According to the information presented in this document, the business opportunities presented by the bid for routes for Metrobus and for the bid for routes of public transportation in 2003 have not counted on the participation of US companies. To date, the participation of four consortia has been confirmed, three European and one Brazilian. They will participate in said bid, verifying for themselves the total absence of US companies, be it in terms of technology or capital.

The same can be said in relation to the technology utilized for the conversion of light-duty vehicles to CNG or LPG, as well as the technology for service stations, where the relevant actors are the Europeans.

The market conditions, part of which have been developed through the Clean Cities Program, are now appropriate for the US private sector to initiate a sustained effort at technological and commercial penetration in the sector of public transportation in the City of Santiago and other Chilean cities. Their technicians, their technologies and their experiences have verified that now is the time to harvest the fruits of their labors.

This recommendation is also valid for the Clean Cities Program that was initiated in Peru, which is beginning in a manner very similar to that in which Chile found itself in 1996. For this reason, the lessons learned through the Chilean experience would be of vital importance. In effect, Peruvian public transportation is private and has similar characteristics to the Chilean public transportation, with a high degree of atomization of its ownership. This implies great difficulties for the implementation of policies, on the part of the Peruvian Government, that aim for the technological transformation of the same.

The Chilean experience, with the arrival of natural gas from Argentina, demonstrated that the conversion to this energy form was given first priority in the industrial sector; later and in parallel, in the commercial and residential sectors. The transportation sector has been that which has presented the most difficulties due to the implemented regulatory environment which requires the use of a third generation conversion kit.

Upon analyzing the Brazilian case, one sees that the conversion has happened in parallel between the industrial and transportation sectors, since the light-duty vehicles are not required to meet emissions standards as demanding as those in Chile. Thus it can be seen that Brazil is witnessing a rapid conversion to CNG in light-duty vehicles due to the price advantage of this fuel over that of gasoline. The same is seen in Argentina, the nation that possesses the largest fleet of CNG-converted light-duty vehicles in the world.

For these reasons, one expects a rapid growth of CNG in the Peruvian market since certainly there won't be the rigid environmental requirements that have been imposed in Chile. In fact, the use of LPG by light-duty vehicles is permitted in the Peruvian market, and LPG delivery stations exist in Lima. For this reason, there is already a familiarity with the sale of gas to the light-duty vehicles, which is the reason that an important penetration of CNG is predicted for Lima, Peru.

4. APPENDICES

APPENDIX 1: NORMATIVA PARA EL GAS NATURAL COMPRIMIDO.

(Guidelines governing CNG. Not translated into English.)

ESTABLECE REQUISITOS PARA EL EMPLEO DE GAS NATURAL COMPRIMIDO COMO COMBUSTIBLE EN VEHÍCULOS QUE INDICA

Nº 55.- Santiago, de 1998.

VISTO: Las leyes N°18.502, 18.059, 18.290 artículo 56 y 18.696 artículos 3° y 4°, el D.S. N°156/90 del Ministerio de Transportes y Telecomunicaciones, Subsecretaría de Transportes.

D E C R E T O :

Artículo 1º.- Los vehículos motorizados livianos y medianos, definidos en los decretos supremos N°S 211/91 y 54/94 respectivamente, ambos del Ministerio de Transportes y Telecomunicaciones, Subsecretaría de Transportes, estarán autorizados para emplear Gas Natural Comprimido (GNC) como combustible, si el modelo respectivo homologado en los aspectos de emisiones y constructivos conforme al D.S. N°54/97 del mismo Ministerio, acredita haber sido aprobado para el uso de dicho combustible.

En el caso de modelos de vehículos diseñados o adaptados, para emplear indistintamente GNC u otro combustible, el proceso de homologación a que se refiere el inciso anterior deberá cumplirse para cada uno de los combustibles que utilice.

Artículo 2º.- Sin embargo, no se aplicará la exigencia del artículo anterior tratándose de los vehículos antes mencionados y de los pesados, de proyectos experimentales, los que excepcionalmente podrán ser autorizados, por un plazo determinado, mediante resolución del Secretario Regional Ministerial de Transportes y Telecomunicaciones, competente en la región donde circulan los vehículos, siempre que no amenacen o afecten el cumplimiento de la política de tránsito en la región y se acredite que cumplen con los aspectos de seguridad que se indican a continuación.

Para el efecto anterior, la persona interesada en el proyecto deberá presentar los siguientes datos y antecedentes:

a) Nómina de vehículos y de sus propietarios, con indicación de sus datos de identificación.

b) Certificado otorgado por el Centro de Control y Certificación Vehicular del Ministerio de Transportes y Telecomunicaciones, que acredite que los vehículos comprendidos en la nómina anterior, cumplen con los requisitos generales de seguridad y los dispuestos por la norma chilena NCh 2109. Of. 87 o la que la reemplace u otras normas extranjeras que por resolución fije el mismo Ministerio.

Artículo 3º.- Los vehículos que utilicen GNC en contravención a las condiciones de seguridad antes señaladas serán retirados de la circulación y puestos a disposición del Tribunal competente en los locales Municipales a que se refiere el artículo 98 de la ley N°18.290, de Tránsito.

Artículo 4º.- El presente decreto no se aplicará en la XII Región en que el uso de GNC como combustible de vehículos motorizados se rige por el D.S. N°51/87, del Ministerio de Transportes y Telecomunicaciones.

Anótese, tómese razón y publíquese. EDUARDO FREI RUIZ-TAGLE, Presidente de la República, CLAUDIO HOHMANN BARRIENTOS, Ministro de Transportes y Telecomunicaciones.

MODIFICA DECRETO SUPREMO N°55 DE 1998, DEL MINISTERIO DE TRANSPORTES Y TELECOMUNICACIONES, SUBSECRETARÍA DE TRANSPORTES

Num. 126. Santiago, 20 de Mayo de 1998.-

***VISTOS**:* La Ley N°18.502 y el Artículo 32 N°8 de la Constitución Política de la República de Chile.

DECRETO:

Introdúcese las siguientes modificaciones al Decreto Supremo N°55 DE 1998, de esta Secretaría de Estado, Subsecretaría de Transportes.

1.- En el artículo 1° inciso primero agregar después de la expresión Gas Natural Comprimido (GNC) lo siguiente: “o Gas Licuado de Petróleo (GLP)” y después de reemplazar el punto (.) aparte por una coma (,) agregar la frase, “según corresponda”.

2.- En el inciso segundo del artículo 1°

intercalar después de la sigla GNC seguida de una coma(,) la abreviatura “GLP”.

3.- En el artículo 2° sustituir la letra b) por la siguiente:

“b) Certificado otorgado por el Centro de Control y Certificación del Ministerio de Transportes y Telecomunicaciones, que acredite que los vehículos comprendidos en la nómina anterior cumplen con los requisitos generales de seguridad y los dispuestos por las normas chilenas NCh 2102 Of. 87 y 2109 Of. 87 respectivamente, ó las que las reemplacen, de las que podrán excluirse los señalados en los puntos 4.4. y 5.3, según corresponda a la primera o a la segunda de las Normas Chilenas citadas”.

4.- En el artículo 3° sustituir la frase “Los vehículos que utilicen GNC” por “Los vehículos que utilicen GNC o GLP”.

5.- El presente decreto no se aplicará en la XII Región, en tanto subsistan Plantas Revisoras Clase A, autorizadas al amparo de la Ley N°18.290 de Tránsito, en que el uso de GNC y GLP como combustible de vehículos motorizados se rige por los Decretos Supremos N°51 y 52, ambos de 1987 del Ministerio de Transportes y Telecomunicaciones, Subsecretaría de Transportes.

6.- Declárase que el D.S. N°52 de 1987, antes citado, con excepción de la XII Región, ha perdido las condiciones que lo hacen aplicable en el resto del país.

Anótese, Tómese Razón y Publíquese.-, Presidente de la República , EDUARDO FREI RUIZ TAGLE, Ministro de Transportes y Telecomunicaciones, CLAUDIO HOHMANN BARRIENTOS.-

CONTRALORIA GENERAL DE LA REPUBLICA

División de la Vivienda y Urbanismo y Obras Públicas y Transportes

Cursa con alcance decreto Nº 123, de 1984, del Ministerio de Transportes y Telecomunicaciones Nº 32.435.- Santiago, 17 de diciembre de l984.

Esta Contraloría ha cursado el documento del rubro, que aprueba el Reglamento sobre "Especificaciones del documento Licencia para Conducir", por estimarlo ajustado a derecho en términos generales, no obstante, se permite hacer presente que en lo relativo a las menciones que deberán considerarse en el anverso del formato de dicha licencia contenidas en su artículo 6º, debe entenderse que la de su letra c) es la correspondiente al número de la cédula de identidad del conductor, como lo dispone expresamente el artículo 26 de la Ley Nº 18.290.

Así también cumple con señalar que lo previsto en las letras i) y j) de su artículo 10º se refiere a las anotaciones y restricciones respectivamente, relativas a la licencia anterior del solicitante.

Saluda atentamente a US.- Miguel Solar Mandiola, Contralor General subrogante.

MODIFICA DECRETOS SUPREMOS Nos 55, DE 1998 Y 212, DE 1992, DEL MINISTERIO DE TRANSPORTES Y TELECOMUNICACIONES.

(Publicación Diario Oficial 25/07/2000)

Nº 131 Santiago, 16 de Junio del 2000

VISTO **:** Los artículos 56 de la Ley Nº 18.290 y 3º de la Ley Nº 18.696 y los Decretos Supremos Nos 212, de 1992 y 55, de 1998, ambos del Ministerio de Transportes y Telecomunicaciones,

DECRETO **:**

1º Agrégase como artículo 2º Bis, al D.S. Nº55, de 1998 antes referido, el siguiente: "2ºBis. Autorízase la circulación de vehículos motorizados livianos que presten servicio de taxi y comerciales livianos y medianos, definidos por los decretos supremos Nos 211, de 1991 y 54, de 1994, del Ministerio de Transportes y Telecomunicaciones, cuyos motores hayan sido adaptados para usar gas natural comprimido (GNC) como combustible, siempre que su antigüedad no exceda de dos años contados desde la fecha de su primera inscripción en el Registro de Vehículos Motorizados y, en que su adaptación para el modelo o tipo de vehículo de que se trate, haya sido certificada por el Centro de Control y Certificación Vehicular (3CV) del mismo Ministerio, en un vehículo nuevo. Respecto de cada vehículo en particular, deberá certificarse en las Plantas de Revisión Técnica, del Decreto Supremo Nº 156/90 (MTT), que su adaptación especial para GNC corresponde a aquélla que fue certificada en el 3CV.

Los vehículos de antigüedad de más de dos y hasta cinco años, que se desee adaptar para el uso de GNC, además de lo anterior, deberán ser previamente revisados en las Plantas antes referidas respecto a sus condiciones de seguridad para aceptar dicha adecuación.

El Ministerio de Transportes y Telecomunicaciones, establecerá las demás condiciones y requisitos que la aplicación de las normas anteriores haga necesarios."

2º Agrégase como inciso final de la letra d) del artículo 73º del decreto supremo Nº 212, de 1992, del Ministerio de Transportes y Telecomunicaciones, el siguiente: "No obstante lo anterior, el Ministerio de Transportes y Telecomunicaciones podrá aceptar que motores originales de fábrica sean adaptados de manera que puedan emplear Gas Natural Comprimido (GNC), siempre que la antigüedad del vehículo no exceda de cinco años, contados desde la fecha de su primera inscripción en el Registro Nacional de Vehículos Motorizados y que la adaptación para el modelo o tipo de motor correspondiente al vehículo de que se trata, esté certificada por el Centro de Control y Certificación Vehicular, en los términos del decreto supremo Nº 55/98, del mismo Ministerio."

3º El presente Decreto regirá desde la fecha de publicación de la Resolución que se dicte de acuerdo al inciso final del Nº 2º bis, que se agrega en el Nº 1º de este Decreto.

Anótese, Tómese Razón Y Publíquese. Por orden del Presidente de la República RICARDO LAGOS ESCOBAR, Ministro de Transportes y Telecomunicaciones

APPENDIX 2: Principle Contributions of the International Seminar "Public Transportation and the Environment: the Challenges of 2000" May 23-24, 2000

EXECUTIVE SUMMARY:

On May 23 and 24, 2000 the international seminar on *Public Transportation and the Environment: the Challenges of 2000* was held in Santiago, Chile, with the distinguished participation of national and international specialists.

The objective of the present document is to present a synthesis of the principle conclusions and proposals that were suggested during this encounter in a manner from which both private agents and the public sector can define future courses of action that will allow them to definitively realize the introduction of natural gas in the public transportation sector and thus comply with the lower pollution (decontamination) targets for the Metropolitan Region that the authorities of the present Government have set as a goal.

Some of the recommendations that this document presents require approval by law, while others will be possible to implement simply through modification or promulgation of new decrees from the Transportation Ministry.

1. What can we do to encourage the incorporation of Compressed Natural Gas (CNG) in the transportation sector?

According to the international specialists that participated in the Seminar, CNG, due to its low level of emissions compared with diesel and gasoline, and its easy implementation, results (from the perspective of an effective cost comparison) in being the best possible alternative for implementation over the next years. Although other clean technologies exist that could be implemented in the future, their application at a commercial level is not yet even at an incipient level of development.

Natural gas will permit the diversification of the energy matrix in Chile, and its price volatility is much less than that of the other derivatives of petroleum, which run the risk of the same abrupt fluctuations as are found in the prices of petroleum.

Recent scientific studies have also demonstrated that natural gas, due to its molecular components (CH4), is the ideal fuel for the extraction of hydrogen such that the CNG distribution infrastructure will be compatible with the needs of future hydrogen fuel cell vehicles.

For these reasons, high political and environmental authorities of the Metropolitan Region have underlined the necessity of implementing CNG as a concrete alternative toward helping to solve the environmental problems of the region.

2. How can CNG contribute to a reduction of transportation emissions in the Metropolitan Region?

Transport has become the largest emitter of contaminants within the Prevention and Atmospheric Decontamination Plan of the Metropolitan Region (PPDA)'s Emissions Inventory.

There are more than 9,500 buses in Santiago using petroleum diesel, over 50,000 taxis and above 200,000 commercial vehicles, which belonging to high mileage fleets, provide the ideal market potential for the use of CNG.

If the authorities desire compliance with the emission reduction goals established in the Basis for the Reformulation of the Prevention and Atmospheric Decontamination Plan of the Metropolitan Region, the specialists agree that concrete measures that permit the incorporation of natural gas and clean technologies must be implemented during 2000 within Santiago's vehicle fleet.

If the authorities give adequate market signals and incentives, the mass application of CNG in transportation will transform itself into a fundamental support for the decontamination of Santiago. This will also imply a modernization of collective locomotion, beginning with the incorporation of clean technologies in Chilean transportation, as is the present tendency in the developed nations.

3. Which are the key agents for implementing the CNG solution?

For success in the implementation of a CNG project, the following key agents must interact in harmony:

- The potential end-users;
- Suppliers of Vehicles, conversion kits and compression technology;
- Existence of competitive financial mechanisms;
- The Government, with clear environmental, tax, and transportation policies;
- The service stations that compress natural gas for the end user; and
- The natural gas distributors.

4. What issues have already been resolved?

- *There is Sufficient Availability of Natural Gas Networks*

Sufficient natural gas distribution infrastructure has been installed in Santiago by Metrogas since 1996 that would permit the supply of a great quantity of CNG distribution points for transportation usage. However, in order to get private investment in compression stations, it is vital that the government provide adequate market signals.

?? *The Technological theme is totally resolved at a global level*

The global experience permits the conclusion that CNG is a resolved issue at the global level. Sufficient OEM (Original Equipment Manufacturer) technology exists, in availability of vehicles, conversion kits, and compression stations, to satisfy the requirements of the distinct segments of transportation. Furthermore, at a global level, end users manifest a growing acceptance of CNG as a result of the enormous benefits the product has demonstrated over time.

The declarations of intention made by the large companies, including Mercedes Benz, Volvo and John Deere, are very clear in the sense of approaching the creation and perfection of CNG motors and other products.

5. What Remains to be done?

?? *Generate a critical mass for the installation of new CNG distribution points*

To initiate the development of this project it is necessary to generate an effective demand for at least 30 million cubic meters of natural gas in annual sales. Only in this way will it be reasonable to expect that some ten new distribution points will be installed in the Metropolitan Region

However, the legal and tax conditions to promote interest among potential investors in this market still aren't present.

The investment necessary for installing complete natural gas compression stations is high and can fluctuate in the range of US$500,000 and US$1 million, depending on the capacity of the compression of its location.

The minimum critical mass could be generated through the conversion of some 5,000 taxis and/or some 12,000 commercial fleet vehicles to natural gas. It is fundamental that the Government undertakes a strong initial effort from the outset, via adequate signals and incentives, in order for the commercial market to begin to operate on its own.

?? *It is necessary to encourage demand in the distinct segments of the transportation sector*

In order for economies of scale to succeed, as much from the point of view of the final price to the end user as from the perspective of optimization of investment, the project of introducing natural gas buses is necessarily complementary to a project introducing taxis and commercial fleets in the Metropolitan Region. This is because the summation of these demands will allow those private agents interested in installing new delivery supply points to amortize their investments over reasonable time frames and offer competitive prices for their CNG.

?? *Correct the tax distortions that are imposed specifically on fuels*

Petroleum diesel currently carries a specific tax of $40/liter versus $140/liter for gasoline. For this reason, one can observe with concern a growing "dieselization" of the Metropolitan Region's vehicle fleet. At the level of the suppliers of automobiles, it is possible to confirm that the sale of diesel vehicles is growing over that of gasoline vehicles. This situation will have serious consequences in relation to Santiago's sharp problem with concentrations of particulate matter and ozone.

It warrants mention that the study of the pilot natural gas bus program, carried out by CONAMA RM, demonstrated that the social damage produced by diesel reaches $111/liter. That is to say, the private decision to use diesel doesn't correspond to an optimal social solution, basically because the use of petroleum diesel is generating social costs that are not reflected in the private price. As a result, it is privately less expensive to operate a diesel vehicle, although the cost to society is higher than that of using alternative, cleaner fuels such as natural gas.

?? *Potential Lines of Financing*

Lines of financing are required to facilitate the conversion to natural gas and to introduce clean technologies into the transportation sector. Public transport requires soft credit to make this transition.

?? *Presenting workshops and training of personnel*

Once the market conditions are in place, investments commence, and the mass development of CNG is seen, permanent training and capacity building of personnel, including certification workshops will be a factor of vital importance to the success of the system.

RECOMMENDATIONS:

Eliminate or modify the specific tax that Law 18,502 of 1986 imposes on the use of compressed natural gas in public passenger transportation, in such a way that CNG is made competitive with respect to diesel.

In order to reduce the cost differential of a gas bus versus a diesel bus, it might serve to temporarily lower to zero the import duties on non-polluting technology buses, and exempt them from paying the Value Added Tax (IVA).

Pass on the social benefit of gas buses to their operators through an investment subsidy for the purchase of new buses or the conversion of existing motors.

In the first phase of the introduction program, the incentives should focus on fleets of vehicles that permit the concentration of potential demand, with the objective of making the high investment necessary to install a private CNG distribution station.

Create lines of soft credit for the purchase of buses, financing of conversions and the installation of compression stations on the part of all those bus operators that are interested.

In this process, the State Bank (Banco del Estado) could play a fundamental role through its small business development units.

To generate the critical mass and achieve the installation of new CNG distribution points, it is indispensable that Decree 55 of 1998 of the Transportation Ministry be modified, and used vehicle conversions be authorized. Previously it was recommended that pilot projects be implemented to verify if atmospheric contaminant emissions complied with the environmental rules in force.

It is important to remember that, from a modern perspective, if one seeks a determined level of emissions, it is fitting to set standards. To prohibit conversions by law or decree wouldn't be effective, because the technology, via market forces, will adapt to comply to said standards.

It is practically impossible for the critical mass to be achieved solely by means of the introduction of new vehicles, because the replacement of vehicles in the taxi and bus fleets is very slow, above all considering the current freeze on those fleets.

Create special incentives for the introduction of clean technologies, assigning more points for natural gas buses in the bids.

Grant benefits such as permitting a lengthening of the useful life of the buses with clean natural gas technology that participates in the bids.

Lengthen the duration of the bids for clean technology buses; for example, extend to eight years the current public transportation bids so that the buses with clean technology can better amortize the new investments.

Create the concept of "green routes" for buses with non-polluting technology. That is to say, these routes would be reserved for those buses that comply with low emission technologies such as the dedicated natural gas buses.

Promulgate new emissions standards for buses that operate in the Metropolitan Region with the objective of giving adequate market signals to the transportation businessmen so that they plan their new investments in clean technologies.

Advance the bids for routes, granting more guarantees and awards to innovative business people inclined to collaborate with the decontamination plan.

Make the Ministry of Transportation's Decree 122 of July 19, 1991, which makes firm the dimensional requirements on collective transportation buses, more flexible. The objective would be a greater supply (more competitive prices) for CNG buses that are sold in developed markets.

APPENDIX 3: Selected Press Articles from the International Seminar: “Clean Cities and the Utilization of Fuels in Public Transportation in the Metropolitan Region"

APPENDIX 4: Record of Dallas-Denver Visit: "Use of Alternative Fuels in Airports" February 12-15, 2001

BACKGROUND:

The Government of the United States, through the Department of Energy's Clean Cities Program, invited representatives of the Government of Chile to attend a conference in Dallas about the use of alternative fuels in airports. Additionally, a visit was paid to installations in the Denver airport and meetings were held with experts in installation and operation of said vehicles. The itinerary for this visit is attached.

ATTENDANTS:

- Sr. David Guzmán, National Director of Airports of MOP
- Sr. Claudio Escobar, Environmental Advisor of the Metropolitan District
- Sr. Marcelo Fernández, Engineer, Atmospheric Decontamination Team, CONAMA RM

RESULTS OF THE VISIT:

- Established contact between the MOP-CONAMA RM District and Clean Cities that could be a great force for the betterment, in global terms, of the expansion of the AMB airport.

- Became very well versed in how AFV (Alternative Fuel Vehicle) technology operates, especially in airports.

- Created links with airports (Dallas Fort Worth [DFW] and Denver) that are using these technologies and that could eventually support MOP in the creation of atmospheric contaminant emission reduction plans for airports.

- Summarized information about:
  - Methodologies for evaluating the environmental impact of airports
  - Available technologies for airport emission reductions
  - Evaluations of alternatives implemented in the DFW airport.

WORK PLAN:

1. Coordinate a meeting between the Manager of Airports, the District, and CONAMA-RM to define the next steps for capitalizing on the experiences gained in this visit, and mold them into a document. The participation of Clean

Cities (Jaime Parada) would be important for this effort due to its experience with implementation of alternative fuels.

2. The orientation document, although political, should include at least the following points:

?? Background information:

  ?? Current state of operations in the AMB Airport
  ?? International examples of successful implementation of AFVs in airports

?? An estimate of the activity inside the airport and the associated emissions. It is understood that within the airport are four sources of mobile emissions and each is regulated differently:

Source	Emissions	Regulated by
Airplanes	Quantified	FAA
Land support equipment	Not quantified	DGAC (General Manager of Civil Aeronautics)
Public transportation	Not quantified	Airport Management
Private transportation	Not quantified	Min. of Transportation

* Public transport: Buses, Taxis, Transfer, etc.

It is recommended that the emissions of each source be estimated and projected to a horizon similar to that of the airport project itself.

?? Delineate an Emission Reduction Proposal. It is necessary to generate a consensus at the political and technical level of "what it possible" to offer, and in what steps. The government could intervene in two of the four categories described; the commitments made should be based on reducing emissions in these two sectors. A technical feasibility study to establish the chronology of implementation of these new technologies will be required. To this end, the following calendar is proposed:

Activity	Target	Responsible Party
Generate a work statement	March 31 2001	DG, MF. CE y JP
Secure a commitment from the Government	April 2001	CONAMA RM, District and MOP
Technological-economic feasibility study	December 31, 2001	MOP
Schedule for implementation	During 2002	MOP

?? Include an analysis of the comparative advantages for AMB Airport to implement AFVs

?? Availability of resources
  - ?? Improve the national and international image of the airport, which receives on the order of 10 million passengers annually
  - ?? Noticeably improve service standards in the airport
  - ?? Administrative independence that permits the creation of regulations specific to the activities inside the airport.
  - ?? Incentives: Make various incentive mechanisms available to encourage the conversion of the airport's various fleets
  - ?? International Support: Technical support is available from the Clean Cities Program and the Dallas and Denver airports. Economically, there is the possibility of accepting some subsidies, although at present this option is not totally clear.
  - ?? The airport represents a large captive demand. This fact makes operation of this type of system feasible, because a large network of service stations is not required, since one way or another the vehicles always return to the airport; many of them never leave it.
  - ?? This offers a great opportunity to compensate for the emissions that the airport currently generates and that, given the increases in travel, it will generate at higher levels each year, independent of the projected new runway.
  - ?? Send a signal from the Government (MOP) of its desire to introduce technologies that help abate pollution in the city.
  - ?? Finally, do not lose sight of the fact that the airport is situated in the municipality that has registered the worst indicators of air quality over the past years. The municipality has recently been implementing a special pollution abatement program, called PRAP.

DETAILED VISIT ITINERARY:

Agenda

Chile Airport Reverse Trade Mission
February 12-15, 2001

Sponsored by

U.S. Department of Energy (DOE), Clean Cities Program
Gas Technology Institute (GTI)

Participants: Mr. David Guzman, National Director of Airports, Ministry of Public Works, Chile; Mr. Marcelo Fernández, Air Quality Team, Regional Chilean Environmental Commission (CONAMA RM); and Mr. Claudio Escobar, Special Assistant for the Environment, Office of the Governor of Santiago, Chile.

Monday, February 12, 2001:

10:39 AM Delegation Arrives at Denver International Airport on AA Flight 615 and travels to the Radisson Hotel, 3333 Quebec St., Denver, CO 80207, tel. 303-321-3500

7:00 PM Dinner with Paul Nelson and Thomas Foltz, Blue Energy Inc.

Tuesday, February 13, 2001:

10:00-12:00 Meeting with Dr. Jerry Gallagher, Vehicle Emissions Consultant, Radisson Hotel, 3333 Quebec St., Denver, CO 80207, tel 303-321-3500

13:30-17:30 PM Tour of United Airlines Facility at Denver International Airport, leave Radisson Hotel Lobby at 1:00 PM

Wednesday, February 14:

10:30 AM Delegation Departs for Denver International Airport for AA Flight 1098 at 1:43 PM to Dallas, Texas

4:35 PM Delegation Arrives at Dallas-Ft. Worth Airport and travels to the Sheraton Grand Hotel at Dallas-Ft. Worth International Airport, tel. 972-929-8400

Thursday, February 15:

8:00 AM-7:00 PM Delegation Attends Southwest Regional Airport Alternative Fuel Vehicle Conference at the Dallas-Fort Worth International Airport, tel. 972-574-6000

Friday, February 16:

8:30 AM-12:00 PM: Delegation Attends Southwest Regional Airport Alternative Fuel Vehicle Conference at the Dallas-Fort Worth International Airport, tel. 972-574-6000

7:00 PM: Depart for AA Flight 945 at 9:00 PM at Dallas-Fort Worth International Airport for Santiago, Chile

*For additional information, please contact Julie Doherty, SAIC, tel. 703-676-5253, Email: julie.p.doherty@saic.com and/or Thomas Foltz, Blue Energy, tel. 202-393-6690, Email: tfoltz@blue-energy.net.

**Please note that Julie Doherty will travel with the delegation and can be reached on cell phone 703-371-6077 during the Reverse Trade Mission.

APPENDIX 5: 2003 Bid for Routes

(provided in English translation by the authors)

A ONE BILLION DOLLARS OPPORTUNITY TO INTRODUCE GNC BUSES IN CHILE

Carlos Capurro and John Harris.
08/22/2001

The government of Chile has a master plan to eliminate air pollution emergencies and pre emergencies in Santiago, by the year 2005.

Santiago has suffered from endemic, severe air pollution for the last several decades. While enormous efforts of different types have been unable to remediate the situation, they have exacted high political, economical and social costs. Chilean government officials covering the whole political spectrum have promoted --repetitively--the need for a cleaner air for Santiago...with meager results. Technical and clinical evidence shows that the major culprit for Santiago's pollution are airborne particles, mostly spewed by thousands of buses using dirty diesel fuel.

Consensus was reached within Chile's democratic processes, on the urgent need to eliminate these sources of air pollution. As an element of this environmental momentum, the Ministry of Transportation will offer in 2003, through a public and international bid, most of the existing Santiago's public bus routes. Currently, the 8,000 buses operating those routes are 100% privately owned by small owner/operators, each owning an average of less than two buses each!!

For the bid of year 2003, only buses meeting stringent environmental standards would be able to qualify. By the year 2003, close to 3,000 of the buses presently operating will need to be replaced. Only new buses with clean technologies will be allowed to enter the bid process. Acceptable technologies will include CNG, clean diesel, electrical and hybrid technologies engines, By the year 2005, close to $880 millions will have been invested, just in new buses equipped with cleaner technology.

During the last decade, buses with European brand names such as Mercedes Benz, Volvo and Scania have dominated the local market. However, US made buses with brand names such as Blue Bird, Thomas and Orion, or US made bus engines branded Cummings, Ford, Chevrolet or John Deere used to be common in Santiago some 10-15 years ago. It is time for US suppliers to regain market share.

The change taking place in Santiago's public transportation service is a major change. The government of Chile is keenly committed to induce technological change. The transportation alternatives in Santiago will be streamlined to allow only clean alternatives. Also, managerial and administrative changes are probable, as government authorities as said to favor large bus operators with substantial fleets instead of a myriad of small bus owners/operators.

The real size of this business opportunity still remains to be determined. However, at least some business areas can be clearly identified:

- New buses running on clean technology ($880 million)
- Large bus operators - directly or through joint ventures (n/a)
- Buses and engines spare parts (n/a)

Source: Ministry of Transportation, Metrogas and other public sources.

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